Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Winter Examination-2015

Subject Name : Computer Aided Design and Modeling

Subject Code : 5TE01CDM1 **Branch : M.Tech.(CAD/CAM)**

Semester : 1 **Date : 21/12/2015** **Time : 10.30 To 1.30** **Marks : 70**

Instructions:

(1) Use of Programmable calculator and any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

SECTION – I

Q-1 **Attempt the following questions.**

a. State the reasons for implementing CAD. **(01)**
b. What is mean by a scan conversion? **(01)**
c. What are the limitations of DDA algorithm? **(01)**
d. What is the importance of 2D transformation in mechanical engineering? **(01)**
e. List the hardwares used in CAD. **(01)**
f. Define homogeneous transformations. **(01)**
g. Write the 3D transformation matrix for translation. **(01)**

Q-2 **Attempt all questions**

a. Scan convert a circle whose centre is (10, 20) and the radius is 10 units using Bresenham's circle algorithm. **(05)**
b. Draw a flow chart for Bresenham's line algorithm. **(05)**
c. Differentiate between conventional design and computer aided machine design. **(04)**

OR

Q-2 **Attempt all questions**

a. Generate a straight line connecting two points (1, 2) and (8, 6) using DDA algorithm. **(05)**
b. Write a C program for the design of cotter joint. **(05)**
c. Discuss the differences between scaling and zooming. **(04)**

Q-3 **Attempt all questions**

a. Show sequence of transformation to be made to mirror any entity about the line with the equation y = mx + b. **(07)**
b. A rectangle ABCD has vertices A (1, 1), B (2, 1), C (2, 3) and D (1, 3). It is to be **(07)**

rotated by 30° in clockwise direction about point P (3, 2). Determine:

(i) The composite transformation matrix; and

(ii) the new co-ordinates of rectangle.

OR

Q-3 **Attempt all questions**

a. Prove that in case of 3 dimensional rotation of objects the rotations are noncommutative. **(07)**

b. Consider a rectangular parallel pipe (RPP) with homogenous position vectors ABCDEFGH **(07)**

$$X = \begin{matrix} 0 & 0 & 1 & 1 \\ 2 & 0 & 1 & 1 \\ 2 & 3 & 1 & 1 \\ 0 & 3 & 1 & 1 \\ 0 & 0 & 0 & 1 \\ 2 & 0 & 0 & 1 \\ 2 & 3 & 0 & 1 \\ 0 & 3 & 0 & 1 \end{matrix}$$

By local scale factors of 1/2, 1/3 & 1 along with x, y and z axes respectively obtain the transformed position vectors after scaling.

SECTION – II

Q-4 **Attempt the Following questions**

a. State the name of software which uses feature approach to create a solid model. **(01)**

b. Write the full form of IGES used as data exchange format. **(01)**

c. Write the Hermite matrix used in Cubic Spline curve. **(01)**

d. State the advantages of solid Modeling. **(01)**

e. Write the types of modeling facility available in CAD packages. **(01)**

f. Define: Synthetic curves. **(01)**

g. What is parent-child relationship used in CAD software? **(01)**

Q-5 **Attempt all questions**

a. What is B-rep and CSG technique in solid modeling? Compare them. **(05)**

b. What are features based modeling technique? What is the significance of this technique? **(05)**

c. Discuss the need for CAD/CAM data exchange. **(04)**

OR

Q-5 **Attempt all questions**

a. What are the different continuity conditions? Explain with neat sketches. **(05)**

b. Explain importance of synthetic curves in CAD environment and write demerits of cubic spline curves. **(05)**

c. Distinguish between direct and indirect data exchange translators. **(04)**

Q-6 **Attempt all questions**

a. The end points of Bezier curve are P_0 (3, 2) and P_3 (1, 3). The other control points of the curve are P_1 (6, 0) P_2 (7, 6). **(07)**

1. Determine the parametric equation of curve.
2. Plot the Bezier curve if the direction of polygon is P_0-P_1-P_2-P_3.

b. Write the characteristics and advantages of B-Spline curve. **(07)**

OR

Q-6 **Attempt all Questions**

a. Three points P_0 (2, 3), P_1 (10, 1) and P_2 (8, 6) are given. Find the equation of the two dimensional Hermite cubic spline that connects points P_0 and P_1 and that is tangent to lines P_0, P_2 and P_2, P_1. Calculate five points on the curve. **(07)**

b. Explain Bezier's surfaces and Ruled surfaces in brief. **(07)**